GLY 4310 Name_____
Homework Exercise 5

EQUILIBRIUM CONSTANT

The equilibrium constant for a reaction can be roughly formulated as follows:

$$K = e^{-\frac{E}{RT}} \quad \textbf{(1)}$$

where E = energy barrier (calories/mole)

R = gas constant = 1.987 cal/° mole

T = temperature (Kelvin)

°C + 273.15 = Kelvin

e = natural logarithm base

1. Suppose a reaction takes place at a constant temperature of 25°C. Calculate K for the following values of E.

E, cal/mol	K
5.0	0.99
50.	0.92
500.	0.43
5000.	2.2×10^{-4}
50000.	2.2×10^{-37}

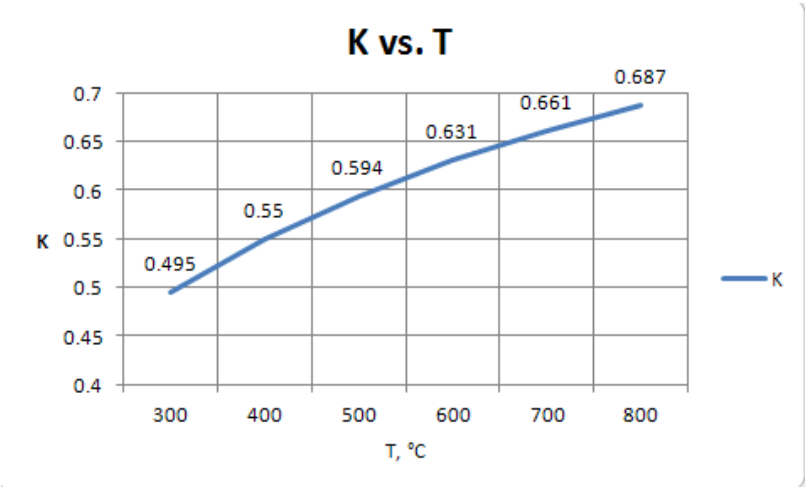
Assume all values of E are good to two significant figures.

2. Suppose a reaction takes place with a constant energy barrier of 800 cal/mol. Calculate K for the following temperatures.

T, °C	K
300	0.495
400	0.550
500	0.594
600	0.631
700	0.661
800	0.687

Assume T and E values are good to three significant figures.

3. Prepare a plot of K vs. T for the temperature range 300 to 800°C. This may be done on a computer, but the plot must be printed out and handed in.



4. For a constant energy barrier of 800 cal/mol calculate the temperature in °C at which the amount of products should equal the amount of reactants (i.e. when K = 0.500). This answer should be calculated to three significant figures. (HINT: Take the natural log of both sides of the above equation).

T = 308 °C